

WHAT IS CLAIMED IS:

1 1. An isolated and purified nucleic acid which hybridizes under stringent
2 conditions comprising hybridization in aqueous solution containing 4-6x SSC at 65-68° C,
3 or 42° C in 50% formamide, to a polynucleotide that codes for human *RRN3* polypeptide,
4 or the full length complement of the polynucleotide, wherein the Rrn3 polypeptide
5 comprises the contiguous amino acid sequence of SEQ ID NO:2, or a fragment thereof,
6 which Rrn3 polypeptide or fragment thereof stimulates ribosomal RNA transcription.

1 2. The nucleic acid of claim 1, which is genomic DNA, cDNA, mRNA or
2 antisense RNA.

1 3. The nucleic acid of claim 1, which encodes human Rrn3 polypeptide of
2 SEQ ID NO:2.

1 4. The nucleic acid of claim 1, which hybridizes under stringent conditions
2 comprising hybridization in aqueous solution containing 4-6x SSC at 65-68° C, or 42° C in
3 50% formamide, to an oligonucleotide of 25 or more contiguous nucleotides of SEQ ID
4 NO:1 or the full length complement of the oligonucleotide.

1 5. An isolated nucleic acid encoding human Rrn3 polypeptide, wherein the
2 nucleic acid is a polynucleotide comprising the sequence set forth in SEQ ID NO:1.

1 6. An isolated polypeptide comprising the contiguous sequence of SEQ ID
2 NO:2, or a functionally active fragment, derivative or analog thereof.

1 7. An expression construct comprising the following operably linked
2 elements:

3 a transcriptional promoter;

4 a *RRN3* polynucleotide which hybridizes under stringent conditions
5 comprising hybridization in aqueous solution containing 4-6x SSC at 65-68°, or 42° C in
6 50% formamide, to a polynucleotide encoding a Rrn3 polypeptide or the full length
7 complement of the polynucleotide, wherein the Rrn3 polypeptide comprises the

8 contiguous amino acid sequence of SEQ ID NO:2 or a fragment thereof, which Rrn3
9 polypeptide or fragment thereof stimulates rRNA transcription; and
10 a transcriptional terminator.

1 8. The expression construct of claim 7, wherein the *RRN3* polynucleotide
2 encodes the human Rrn3 polypeptide of SEQ ID NO:2.

1 9. The expression construct of claim 7, wherein the *RRN3* polynucleotide is
2 the sequence set forth as SEQ ID NO:1.

1 10. The expression construct of claim 7, wherein the transcriptional
2 promoter is a heterologous promoter.

1 11. The expression construct of claim 7, wherein the transcriptional
2 promoter comprises at least a portion of the human *RRN3* promoter.

1 12. A cultured prokaryotic or eukaryotic cell transformed or transfected
2 with the expression construct of claim 7.

1 13. The eukaryotic cell of claim 12, which is a mammalian cell.

1 14. The eukaryotic cell of claim 12, wherein the *RRN3* polynucleotide
2 encodes the human Rrn3 polypeptide of SEQ ID NO: 2.

1 15. The eukaryotic cell of claim 12, wherein the *RRN3* polynucleotide is
2 the sequence set forth as SEQ ID NO:1.

1 16. The prokaryotic cell of claim 12, which is an *E. coli* cell.

1 17. The eukaryotic cell of claim 12, which is an *S. cerevisiae* cell.

1 18. A vector comprising the expression construct of claim 7.

1 19. An isolated host cell comprising the vector of claim 18.

- 1 20. A method for producing a Rrn3 polypeptide, which comprises:
2 growing cells transformed or transfected with the vector of claim 18; and
3 isolating the Rrn3 polypeptide from the cells.
- 1 21. The method of claim 20, wherein the cells are bacterial cells.
- 1 22. The method of claim 20, wherein the cells are *S. cerevisiae* cells.
- 1 23. The method of claim 20, wherein the cells are cultured mammalian
2 cells.
- 1 24. The method of claim 20, wherein the cells express human Rrn3
2 polypeptide as depicted in SEQ ID NO: 2.
- 1 25. An antibody that binds to human Rrn3 polypeptide.
- 1 26. The antibody of claim 25, which is a monoclonal antibody, a
2 polyclonal antibody, a single chain antibody, a heavy chain antibody, an F(ab')₂, F(ab'), or
3 Fv fragment.
- 1 27. A eukaryotic polypeptide, or a functionally active fragment thereof,
2 comprising the consensus sequences:
3 (i) Tyr(Ile/Leu)(Ala/Gly)(Ala/Ser)(Phe/Tyr)(Ile/Leu)(Ala/Ser)ArgAlaLys;
4 (ii) PheTyr(Ala/Ser)XaaXaaGln(Ala/Ser)(Ile/Leu)XaaXaaXaa
5 (Phe)XaaPheArg; and
6 (iii) PhePro(Phe/Tyr)AspXaaXaaXaaLeu(Lys); wherein Xaa can be any
7 amino acid, and wherein the polypeptide, or fragment thereof, stimulates ribosomal RNA
8 transcription; with the proviso that the polypeptide or fragment is not *Saccharomyces*
9 *cerevisiae* Rrn3.
- 1 28. A method of identifying agonists or antagonists of a eukaryotic Rrn3
2 polypeptide comprising:
3 administering a candidate compound to a first cell that expresses a first
4 Rrn3 polypeptide;

5 administering the candidate compound to a second cell that expresses a
6 second different Rrn3 polypeptide;
7 and determining whether the candidate compound produces a physiological
8 change by the first cell, but not by the second cell.

1 29. The method of claim 28, wherein the first and second cells are yeast
2 cells having a null allele of the yeast *RRN3* gene.

1 30. The method of claim 28, wherein the first and second cells are
2 mammalian cells.

1 31. The method of claim 28, wherein the second Rrn3 polypeptide is
2 human Rrn3 polypeptide.

1 32. The method of claim 28, wherein the first Rrn3 polypeptide is a
2 derivative of the first Rrn3 polypeptide.

1 33. The method of claim 28, wherein the candidate compound inhibits
2 growth or division of the first cell.

1 34. The method of claim 28, wherein the candidate compound stimulates
2 growth or division of the first cell.

1 35. A method of screening for hypoproliferative or hyperproliferative
2 disease comprising:
3 obtaining a sample comprising polynucleotides from a subject;
4 contacting the sample with a nucleic acid that hybridizes under stringent
5 conditions comprising an aqueous solution containing 4-6x SSC at 65-68° C, or 42° C in
6 50% formamide, to a *RRN3* nucleic acid that codes for human *RRN3* polypeptide, or the
7 full length complement of the *RRN3* nucleic acid, wherein the Rrn3 polypeptide comprises
8 the contiguous amino acid sequence of SEQ ID NO:2, or a fragment thereof, which Rrn3
9 polypeptide or fragment thereof stimulates ribosomal RNA transcription; and
10 determining whether aberrant levels of *RRN3* gene expression are present
11 in the sample.

1 36. The method of claim 35, wherein the subject is a mammal.

1 37. The method of claim 36, wherein the subject is human.

1 38. The method of claim 35, wherein the disease is cancer, malignancy,
2 hyperplasia, metaplasia, dysplasia, benign tumor, hyperproliferative disorder, a benign
3 dysproliferative disorder, an autoimmune disease or cardiac disease.

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